Oral History of Webb McKinney

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Recorded: June 6, 2008
Mountain View, California

CHM Reference number: X4701.2008

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Webb McKinney

Conducted by Software History Center—Oral History Project

Abstract: Webb McKinney was an executive in Hewlett Packard over many years and involved in various efforts to build software to run on HP instruments, specialized equipment and eventually on minicomputers and personal computers. His recollections illustrate how the decentralized operation of many of the HP products led to multiple developments of both minicomputers and personal computers with conflicting architectures and business models. While these competing technologies would get resolved over time, HP was often late to market and never really focused its computer software on the broad personal usage market. HP wanted to differentiate its hardware platforms through its unique software, but the market migrated to a Microsoft Windows platform and neither the customers nor the software producers were prepared to go a separate route.

Michael Mahoney: I'm Michael Mahoney and I am interviewing Harry Webb McKinney of Hewlett Packard. We are at the Computer History Museum in Mountain View, California and it is June 6, 2008. This interview is being done as part of the Software Industry Special Interest Group's Oral History Project. Tell me how you got to Hewlett Packard.

Webb McKinney: Well, actually, it's an interesting story. My mother had a very close friend who moved from southern California to Los Altos, California, which is very close to Palo Alto, which is where HP is located and we used to visit her in the summers for vacation and from the time I was eight, I wanted to live in the Bay area. And so, when it came time for me to graduate from the University of Southern California, although most of the people went into the aerospace business in southern California, I wanted the Bay area. I'd had a summer job in aerospace and I didn't like the environment, the sort of hire and fire environment there. And so I asked my uncle, who was a stockbroker, what were some good companies in the Bay area and he said well, I hear great things about Hewlett Packard. So I interviewed with them and ended up here.

Mahoney: Were you a double EE major?

McKinney: Correct, Yes.

Mahoney: You got a Bachelor and a Masters at Southern Cal?

McKinney: Both, Yes.

Digital Instrumentation at Hewlett Packard

Mahoney: In what capacity did you come to Hewlett Packard?

McKinney: Well in those days they asked you whether you were into analog or digital and I said digital, so I went to a division that was called, "Frequency and Time," which subsequently became the Santa Clara Division and I worked on probably the first major fully digital instrument. This was in the instrumentation part of the company, which is now Agilent Technologies. It's a separate company from Hewlett Packard, but it was in instruments and this was the very beginning of the idea that you could digitize the wave form. You do everything with digital computers and then if you need an analog output, you make it into analog signal again, using DA [Digital-to-Analog] at the end. It was all pretty sophisticated for those days: array arithmetic, Fourier transforms, modal analysis, a lot of math basically to do the measuring. So that was how I ended up in that organization.

Mahoney: Were you working on the products themselves?

McKinney: Yes, actually my first year was in marketing. The product line that was called Fourier Analyzers at the time had just come to market in I think this was 1969. The Fast Fourier Transform, the Cooley-Tukey algorithm, had just made it practical for computers of that era to actually compute Fourier transforms fast enough that they could be used for spectral analysis, and digitizing in those days was sort of a 25 kilohertz useful bandwidth, so the applications tended to be mechanical in nature, measuring structural resonances of cars, planes, trains, helicopters, buildings. They had just started coming out with this product, which was totally new for HP, both the technology and the application. I was on the marketing team and I trained the sales force representatives. I trained some of the first customers and then I moved into R&D where I spent the next 11 years or so in R&D on that product, developing the product, and subsequently being the R&D Manager for the Fourier Analyzers and a few other products.

Mahoney: How were you identifying who your customers were when you were marketing it and what was your relationship to them?

McKinney: Well it was really, “who does things below 25 kilohertz?” And of course HP, at the time, the main instrument sales force was primarily selling to electronic designers, for microwave design; this type of thing was really where most of it was. We actually had to create our own sales force within the overall instrument sales force which was focused on mechanical applications. And we were coupled together with another product line call "Laser Interferometry," which made very precise distance measurements that was, at the time, used in machine tools and now is, by the way, built into almost all the wafer stepper and IC

manufacturing equipment; but in those days, it was a mechanical application, so they were both from the same division. We said let's put lasers and Fourier analyzers together and create sales specialists out there. So in the beginning, it was a question of some prospecting and trying to find who really is interested in this. We pretty quickly found quite a few customers in transportation for people designing vehicles, space vehicles as well as automobiles.

Mahoney: To what extent did this involve educating them in what they needed?

McKinney: Well it was a different way for them to solve their problem. In fact, in those days, I have to say that the Fourier Analyzer computer that we used was a minicomputer, so it was a 2114, 15 or 16. You had a choice. I remember that the main product had 16K bytes of memory, so you put that in the context of probably what's in your wrist watch today, but it was a rack full of equipment at the time. I think that this was relatively new for the customers in terms of the way to make these measurements. They hadn't really been able to do this before. I used to say to get a Fourier Analyzer you needed $100,000 and a PhD, because the customers that actually used this equipment typically were PhDs. They were very sophisticated, highly educated people. This ultimately became a much broader market and we came out with much lower cost, simpler to use products. But in the very beginning you could almost think of this as a giant programmable array calculator and people had to know a lot about not only the problem they were trying to solve in terms of their structures, but quite a bit about math and measurement in order to actually get a result out of one of these.

Mahoney: This actually gets us towards software.

McKinney: Yes.

Mahoney: Who provided the software for that?

McKinney: Well, we did it all.

Mahoney: Did you sell a package?

McKinney: Over time, we found that there were general purpose sales, so we would sell one of these $100,000 systems and not be too sure what it was used for. We also found, over time, that there were some specific applications where we developed software beyond the norm. So the software that was in the Fourier Analyzer was really the software that allowed customers to write a program in a high level language to say, “Okay, take from the analog to digital converter, put it into block one, take a Fourier Transform of it, square it, add it to that.” So it was kind of like a big calculator program, except instead of operating on individual numbers, we were operating on arrays and so we did all the software that allowed people to write those programs. And then over time we developed some specific programs, one was called "Modal Analysis," which

actually showed you how the first mode of vibration would look and/or the second mode. In fact, one of the famous applications after the fact was for the Lockheed Electra, which, you probably remember, had a problem where the propellers excited a vibrational mode in the wings and the wings would fall off. It's like the famous Tacoma Narrows Bridge.

Modal analysis is a sophisticated technology that allows you to actually measure those modes of vibration and then display them to show kind of what they look like. So we did a fairly sophisticated piece of software and sold it as a modal analyzer. There was the general purpose Fourier Analyzer. There was a Modal Analyzer. Another one was called Signature Analysis where we looked at, essentially, how the structure's vibrations changed at different RPMs, so you'd actually have the RPM versus time kind of a map. Another one was actually shaker vibration control, and this was primarily used in space. If you wanted to simulate the satellites that were being designed back in my home in southern California, they really didn't want them to break during launch. They were pretty expensive. So we actually programmed a Fourier Analyzer to, they would basically say, "Here is what the spectrum looks like at launch and we want you to excite the satellite with that spectrum and then we want you to ramp up the amplitude very carefully <laughs>, and then measure what's happening and hopefully you don't break it." So that was a closed loop vibration control application. We actually had a special group that we created for customers who'd say, "Hey I want you to solve this problem for me." They would come to us and we had applications engineers who would create software. We would have liked to sell a general purpose system; you program it yourself, with pre-made packages. Then customers might come to us and say, "We've got a unique solution here that probably no one else wanted. They may not, but we're willing to pay your engineers to program this for us." So we would do it. It was mostly software. Obviously, you had to have a good analog-to-digital converter, but after that it was really all software.

Mahoney: Was this part of the sales function?

R&D Functions for Digital Instrument Computing

McKinney: No, this was in the R&D. I was in marketing just the first year and that was primarily training the sales force because we had to hire these sales specialists who hopefully knew something about at least the applications. Then I had to train them on how this Fourier Analyzer thing actually worked and how they should sell it and so on. And then, we actually had a training course for customers, so I trained some of the first customers. And after about nine months or so of doing that, I said, "Boy, I'd like to invent this stuff. This looks like a lot of fun and I have a Masters in double EE." That was not a crazy idea to go into R&D at that point.

Mahoney: Was this going to expand your market from HP's point of view and lock your customers in?

McKinney: Yes. Yes. This was a product line expansion and I guess, again, it had the dimension that it was a different technology and a different market, so those were always harder when you're changing two variables at the same time. So it was challenging. It was really a start-up inside of a big company, which also made it a lot of fun. I still am close friends with a lot of the people I worked with in those days where we just created this business and it was reasonably successful and it's still around.

Mahoney: Was HP fully supportive of you?

McKinney: Yes. But there were issues inside HP in creating a new sales force, which was not a popular thing to do with the sales management of the normal sales force, so there was some tension around, “Our guys can sell this” or “Why would we go into a business where we needed different sales people? Maybe we shouldn't do that.” And then the other issue was it was a pretty complicated system. In HP, at the time, the instrument business was little boxes. You sent out little boxes. It was a voltmeter, a counter, an oscilloscope, a spectrum analyzer. But, in the early days when we started, a $100,000 computer system that was applied to measuring applications was unusual. So the other concern, I think, about the business that some people in HP had was, “Well wait a minute, why are we doing a system?” And ultimately, of course, everything is a system and everything that's digital turned out to be not a crazy thing to do, but it was pioneering at the time.

Mahoney: Was there any thought of separating the software from the hardware?

McKinney: Not then.

Mahoney: Was it locked into the machine?

McKinney: No, I would say not at that point in time because in a good month, as I recall, we sold maybe ten systems, so this was not a broad market. You need volume in software to make money. And so I think this was more viewed as a solution business that included both the hardware and the software. I don't remember how we priced it; obviously these specials cost something. But we probably more or less gave the software away and made the money on hardware. It wasn't unusual in those days but I suspect most of the profit certainly came from the hardware.

Mahoney: Like the early IBM model?

McKinney: Yes.

Mahoney: You got yourself a system and people came in and programmed it for you.

McKinney: Yes. Yes. I don't actually remember this, but I'm sure if you bought the Modal Analyzer it cost more than the basic Fourier Analyzer and that was all pretty much software, so we charged for it but it was in the context of the system.

Mahoney: Your customers could program the machine themselves?

McKinney: Yes.

Mahoney: Were your customers going to independent vendors to program their machines? Was there an opportunity there for independent vendors to come in?

McKinney: Later, later, in fact, some of the people who developed software for this product actually created their own independent business and it was a consulting/software business. So they would go into customers and use other people's hardware and they would do the software and the consulting to solve their problem. So there were a couple of them; but again, this wasn't a huge market. This isn't like the PC market or something. But there were a couple of firms around. There was Time/Data, which was bought by General Radio. There was another company on the East coast, so there were maybe three or four vendors that were in this general space and there were some consultants. There was another company called SDRC, Structural Dynamics Research Corporation. They did finite element modeling and what we ended up doing is actually hooking the finite element modeling together with our modal analysis. So what companies began doing was that they would build a computer model of let's say a car, and they would iterate and iterate and iterate on the computer and once they thought they had something that was perfect enough then they would build a physical model. Then they would use our product to instrument and actually measure the model and that would be fed back into the finite element model and they would iterate, iterate, iterate on that closed loop. I think it cut the design time by a factor of three or something because the old way was you build a model; you test it; you build another model; you test it; and so on. That's probably the broadest context, I guess, and that was all lots and lots of software on the analysis side of finite elements.

Mahoney: Who was this software developed by?

McKinney: By another company, by SDRC, I think, Structural Dynamics Research Corporation. I think they were in Cincinnati. I don't know what happened to them.

Mahoney: Did they design it to run on your equipment?

McKinney: They were around already. I think both these businesses were essentially enabled by the advent of reasonably priced, reasonably sized computers. So this is the beginning. This is 1969, 1970. This is the beginning of the minicomputer era and initially we hadn't hooked these two together. We were just doing the measurement side of it. But, I think

probably customers asked us to hook this together because they said they were increasingly looking at finite element modeling and I don't know what they're business model was, but that was software. That was all software, basically. And then what we began to do was work closely with that company and with our customers to be able to close the loop, so that, at the point that they wanted to, actually build a physical model, then they would test it using our system and then we could update the finite element model assumptions and so on.

Mahoney: Was this a cooperative arrangement between you and the ISV [Independent Software Vendor]?

McKinney: Yes, I think you could think of it as an open market kind of thing.

Mahoney: No competition?

McKinney: We weren't competing with them. I think the companies we were competing with, to the best of my knowledge, were all like us. They were all hardware companies, as things began; the earlier products that attempted to do this were analog and so the big leap was really from analog to digital and then once you were digital then you could do a lot with software and so it sort of evolved. And HP, as I recall, was never heavily in the analog part of this, so we came in when the digital transition happened and we became the leader along with this organization that was bought by General Radio and they had similar products. Then our software got more and more sophisticated. There were a couple of companies around who did software who were independent of the hardware and I remember this one group. I remember the guys but I don't remember what they called themselves. There are probably a couple of them still around that do this. As manufacturing started to move off shore, this business actually had grown pretty rapidly but it flattened out. I think this business is still pretty “nichie” by computer standards.

Mahoney: Your relation to them was you made the systems. It was programmable and they figured out how to program it.

McKinney: Yes and they might have, in fact, offered competing products. For example, for our modal analysis package they might enhance that. They probably did because they came from our team.

Mahoney: Were these your people spinning off?

McKinney: Yes, and the two organizations I'm aware of, and I think there was a third, both had members of our team that looked at this and said, “Hey, there's an opportunity out here to do software independent of the HP business.” They were basically adding value, their own value, on top of what HP was doing. And much like our Specials Group, they probably were an

open market group that was looking to help solve specific customer problems. So I'm sure they were trying to leverage their technology, but they would go into a particular customer and say, “How could we help you get a better solution?” So it was competitive in a sense, but it was complementary as well because they were helping us create a bigger market.

Mahoney: Were they helping you technically?

McKinney: I don't recall frankly. I know that we had a very helpful relationship with a professor at the University of Cincinnati named Dave Brown. He came to us with a lot of good ideas and then we would go to him with our latest products and say, “Try this out and tell us what worked and what didn't.” And these guys who ended up spinning off into their own software business were really close with him, but I don't really remember in detail how much we learned from what they were doing.

Operating Systems

Mahoney: Were you using any kind of development tools, operating systems?

McKinney: It was pretty simple. We basically wrote all the stuff in assembly language, machine language in the beginning because memory was at such a premium. So, there was I guess you'd call it a very simple operating system that we built for this machine and then the application we built on top of that, but it was not a general purpose operating system in that sense. Later, a couple of things happened to this. One is that we really saw the opportunity for, “what if we could build a product like this that didn't cost $100,000 and didn't require a PhD?” We were trying to figure out how to broaden the market. You might have to give up some of the complete flexibility and programmability, but we built a product. This was I think in the mid 1970s. It was only about this big [using his hands to show the size], so it wasn't a rack full of equipment. It actually had the main motherboard of the latest HP minicomputer in it, but you wouldn't look at it and think, “That’s a computer.” It looked like an instrument, like instruments looked in those days when they went to all the buttons that were digital. And one of my jobs was to write an operating system for that and that software was going to be for the next generation of the systems as well. I actually had the job of writing, my team and I, a dedicated operating system. It was more of an operating system in that we then would write all the subroutines and stuff we needed that would plug into that, but I think that was all still assembly language in those days, machine language. Then we did end up using that software for the core of our whole series of products. As I recall, that cost $25,000 or something and sure enough it was a lot simpler to use and its flexibility was not as great; although, by then, you could hook it to a computer and you could program it to do other things from outside of it, so you could get some of the flexibility that way.

Mahoney: Would you go to another computer? Would you write a program there and then cross compile it?

McKinney: Well, no you wouldn't. You couldn't drop it into the instrument, but what you could do is take information so if the instrument could do a bunch of stuff you could then get the data out of it and then you could do additional stuff on the outside. It still wasn't as fully capable as the high end system, but that was actually a pretty successful product. And then we built a modal version of that, so if you wanted to do modal analysis you could have a modal analyzer that was in that same form factor. And our biggest challenge was we kept running out of memory. The memory architecture in those days was not sufficient. The disk drives in those days were like this big and so we had some challenges with what the technology could let us do. I remember it was in those days, whatever the limit was in how much memory you could address, we actually had to build a special back plane where we could say, “Okay, flip a switch and use that memory bank.” We actually found a real kludge way to double the amount of memory we could put in. Somebody used to say that software is a gas that expands to fill all available space.

Mahoney: It still is.

McKinney: Yes, it still is. So we were trying out those principles, I guess, in the mid 1970s.

Mahoney: Where were you getting your software technology from?

McKinney: What do you mean by software technology?

Mahoney: Well in terms of thinking about operating systems. Were there people coming in with computer science degrees to help you?

McKinney: I bought a book called "Operating Systems Principles." I probably still have it. I read it and there was one really bright guy on my team and we talked about how to do it. It was home grown. We weren't trying to build an operating system for the next generation of computers here. We wanted to build an operating system we thought would solve some fairly focused instrumentation needs. Although one of the things I did learn in the process was that the objective I had been given was to build an operating system for this instrument and oh, by the way, make sure that it works for other products that aren't yet defined. That's a hard problem to solve <laughs>. We ended up trying to generalize things too much and then we had performance issues and really had to do some major tuning to get the thing to perform because these were real time applications. And so a lot of the stuff we did actually was done down at the interrupt level. The operating system dealt with a macro assignment of tasks and stuff, but if something had to happen in real time we basically had to do it at an interrupt level and executed a routine. That was the way we were able to handle the real time aspects of it.

Mahoney: Was this an operating system that allowed you to set the machine up for the customers as opposed to something the customer would use?

McKinney: Correct. Yes. It wasn't visible to the customer at all. It just allowed us to manage what was going on in software. You would look at it and there were microwave people at the same time, we actually shared the bezels and the keys with them, so you'd see an analog microwave spectrum analyzer sitting right next to this that looked just the same, but if you took off the front, what you would see was an analog to digital converter, digital filter, and a computer <laughs>, right and then a device to drive the display. The technology inside was completely different and as, you pointed out, it was an operating system, although a rudimentary one. But the only software element to that business, independent software element, would be people who were writing software to take data from those instruments and then do more with them, so it would be probably be in what today would be called an engineering work station, a scientific desktop calculator, the 9100.

Mahoney: They would be programming those to talk to your device but they wouldn't be programming your device.

McKinney: To the best of my knowledge, no one ever did that for the instruments that we built. They did that for the systems but the same companies would build calculator programs. They were called, "Get Additional Information", "Better Results" or whatever.

Lessons in Developing Software

Mahoney: Did you learn things from this that had generic benefit to you for later projects?

McKinney: I'm sure I did. Of course, this business is how I started; I started as an engineer. I did digital hardware design. I did a lot of software. Then I became a project manager and a section manager and ultimately ran the R&D lab that included this plus the lasers and frequency standards and various other things. So, yes, I learned a lot about how to get stuff done. Again, I think in terms of the software side of it, I guess I learned much. The book that was very popular at that time was called, "The Mythical Man Month."

Mahoney: I've read it and it's the 25th anniversary.

McKinney: Yes. That whole set of learning is about just throwing people at a problem [doesn't solve the problem]. These weren't probably by today's standards huge projects. I know the software was behind on this when we were building this instrument, and I think we had maybe five people full time. I was sort of half time a manager and half time a programmer. And I learned in doing that, by the way, that the program tasks you give yourself better not be that important because somebody has to manage the thing right. So I did some things that weren't

that critical and that I could give to someone else if I got too busy. But I did have this experience of, “uh oh, we're a little bit behind. Let's put somebody else on.” And I then realized that that creates more people for the manager to talk to.

Mahoney: It doubles the lines of communication.

McKinney: Yes, exactly, exactly. So I guess that was one of my first learnings about, it's a more general concept, about organizational complexity and what that creates. And then I think this sort of software expanding. Software as someone said,” It's very easy to define what you want to do but just doing it sometimes is harder than you think.” So I think the difficulty we had was in predicting when we were going to finish this and how much memory it was really going to take. There was some general learning along those lines. Again, the tools we used in those days were very simple. It was assembler, really. In those days we didn't have sophisticated tools to help us with this. I don't even recall project management tools in those days.

Mahoney: Your programmers were regular members of the lab? Were you going out and hiring programmers?

McKinney: Correct. No, I don't think we ever did. In those days, there weren’t people who were designated as software designers. They were engineers as we called them. They were the full time employees of the company and I think it was just a question of how many we put on this particular project.

Multiple Microcomputer Projects at HP

Mahoney: What was your next step?

McKinney: Well, I think I was in this product line for 12 years or something like that, so I stayed. I really enjoyed it. I enjoyed the nature of the work and the technology was changing rapidly and allowed us to do more and more and more. I described the instrument that we built that had the computer in it. It turns out that there was another division in Loveland, Colorado, that had been focused on electronic measurement, analog spectrum analysis, relatively low frequency, not the microwave stuff but focused on audio types of applications and they looked at what we were doing and said, well we can do that. We can do it better and cheaper. And so they actually built a product that was smaller and cost much less. I think it cost $15,000 compared to our $125,000. They used a proprietary HP microprocessor that had been developed for our calculators, our work stations. They built integrated circuits to do the digital filtering where we had had a discrete design and they basically came out with this product that did about 70 percent of what ours did for less money and suddenly the company looked at it and said well these things are competitive, even though they had come at it from audio and we had come at it from mechanical, the frequencies are creeping up. And so the company decided to

create a new division to combine these efforts, along with this systems one. They created a whole division to go after this business opportunity, put it together and placed that division in Lake Stevens, Washington, which is near Everett where Boeing builds 747s. And I didn't want to move. Back to my story about how did I end up at HP, I ended up at HP because I wanted to live in Silicon Valley and we went up to Washington and looked around and, you know, the weather, we did never see the sun in the week we were up there.

Mahoney: I spent some time there.

McKinney: And by the way, it's a lovely place. I have a lot of good friends up there, but at this point in time, small children, where I was in my life with my career, I didn't really want to move up there, so I stayed here and I helped transfer those products to Washington. Then I looked around the lab I was managing and it was laser interferometry and atomic frequency standards, okay. So back to that first question they asked me when I interviewed, analog or digital, I said digital and I looked and I said this is all sort of physics, analog stuff. And I called a guy I had worked for who was running the newly formed personal computer division. This is now 1983 I think and HP was just starting to try to figure out how to get into the PC business. And the guy who was responsible for desktop PCs I had worked for in this prior business. I called him up and I said, "You know, I'm just figuring out that I really want to stay around the Bay area for the next few years and all the opportunities in instruments are out in places that aren't here and is there anything going on over there?" He said, "Well that's really interesting. We're just looking for an R&D Manager. Why don't you come over?" So he hired me to be R&D manager for desktop PCs. I left Santa Clara Division and I moved about three miles to Cupertino and I lucked into the world of computers, which I never left after that and they are digital <laughs>. I guess it depends on how far you go down, but yes.

Mahoney: Many aspects of this must have been quite new to you.

McKinney: You know the saying if it doesn't kill you, it makes you strong. This was my defining moment, I think. I had been in this one business for my whole career. I was very comfortable there, understood it very well and suddenly you are thrown into not only a new business but PCs in 1983 were chaos, at least inside of Hewlett Packard. The IBM PC, Apple of course has been there early and there have been many stories told about how Steve Wozniak actually was an employee of HP and HP wasn't interested in the PC. So Apple went off and did their thing and then IBM came along, which was a big problem for HP and suddenly the PC business was taking off and HP was not there. But HP had pioneered personal computing on the technical side with the workstations. So, before the time I joined the company they already had a desk top personal computer, but it was focused on scientific, technical applications. But HP hadn't figured out the PC business and then we had all these terminals that were hung on our minicomputers, graphics terminals and block mode terminals, and the terminal division kept making them smarter and smarter as the processors got cheaper but that's a peripheral. It's not

the computer and on and on and on. And then HP had the calculator. We had the hand held calculators and that organization started building sort of technical personal computers that were cheaper than the ones in Colorado.

Personal Computer Software

So we had all these efforts all over the company. And HP had just pulled together for the first time in, I think, it was 1983 something called the Personal Computer Group under a guy named Cyril Yansouni and his charter was: a) make sense of all this stuff that's going on in the company, and b) make us players in the outside world in personal computers. He had the terminals. He had the calculators and our desktops. He had this division that had been created to go after the desktop business. He didn't have the scientific stuff at that time.

So what I walked into was pretty chaotic and it actually turned out that there were 120 engineers in the lab. The lab I had been managing was more like 40 or 50, so it was a pretty big jump up for me in terms of complexity, going to a business I didn't really understand. It turned out nobody there really understood, very few people understood it. And I think there were five different personal computers under development and only one of them ever came out. The other four-- well the one that came out didn't make a lot of sense and the four after than made even less. So I didn't know what I was getting into at the time, but we fundamentally had to start everything over before we came out with our first real PC two years later, which was called the Vectra. That was one of those things where the first six months I was there I was having trouble sleeping and I didn't always have a good appetite and I thought what have I done, little kids at home and you're thinking, what have I done and somehow at about six months I started figuring it out. And any time I have been in a tough situation since then, I've just think well I guess I'll get through it somehow <laughs>. I haven't worried about it as much.

Mahoney: China set a new standard or a new floor for our expectations.

McKinney: Yes, Yes, so it was one of those things. I'll give you a little bit of background since we're talking about software here. The software came from Microsoft in those days, right, so it was DOS. This was the 8086 sort of first generation of that stuff and the IBM PC and XT were out and we were trying to figure out how to come up with something to counter that and it was using DOS. But at the same time, HP is a company where innovation is kind of at the core, and we had said well how are we going to differentiate ourselves in a business that's that standardized? And one of the things it took us a while to figure out was that the software that was written for the IBM PC and was literally written for the hardware. It was written to the register level. I mean, if you didn't have a certain chip on your motherboard, the software wouldn't run. The disk controller - there were people writing software that actually went in and twiddled bits on chips on the board. And we talked about IBM compatible, which was the word in those days. It was pretty much to a true clone right all the way through, and that was

abhorrent to Hewlett Packard, particularly the management. In fact, I remember when I showed John Young this first PC that we finally somehow got out that was a real PC, his questions is, “What's the contribution?” That was certainly a good question, no doubt about it.

So the hardware took a while to figure out. The reason the othe PC’s we were developing never came out is that they were not even compatible with one another at the hardware level and we've been building terminals and other things where it didn't matter. We just had to make sure how it communicated with the mini-computer. It was standard and everything was fine. Well, so it took us a good year to figure out, oh my God, running the IBM and then at the same time the market. At that time by the way, DEC was out there with Rainbow and the Professional, I remember this. And they were incompatible with one another. So it wasn't just us. Texas Instruments was out, Compaq with their first luggable, AT & T. So there's this plethora of people coming out with MS/DOS machines of various types and we just felt this incredible sense of urgency that we had to get into this game. We were late. They should have hired somebody who knew this business better than I did <laughs>; it took me probably a year to really finally get to the core of what this really means.

And then, what I was going to say was, at the same time the market was growing and growing and growing for really IBM compatible PCs. And so, we reached a point in about probably 1984 where we went out to talk to the computer dealers who were selling the IBM PCs and they said that we're not going to carry software, because the products we had before weren't compatible with the IBM PC. So we had to have our own software, and I can talk about that a little bit. We actually paid ISVs to develop for our first product: the HP 150, and it was an MS/DOS machine but it was not even close to hardware compatible with the IBM PC. So we literally had to go out and pay Lotus and Word Perfect and all these people to port their software onto the HP 150. As time passed, two things happened. The lost opportunity cost of them doing that got very high. In other words, they didn't want to spend money porting to the HP 150 that doesn't sell that many. They needed to focus on the real market and put their R&D into adding features and capability. On the other hand the dealers basically said I don't want HP software on my shelves. It's not worth it. Retail is about SKU’s [stock-keeping units] and turns and all that stuff and the dealers were the same way, and “This mouse works with all the IBM clones. I'm not going to carry another mouse for you.”

So we were getting this message from both sides that we really do have to be fully IBM compatible. That was kind of what was happening on the hardware side where we actually said, okay how do we make a contribution in the context of that? And the only real major software issue we had was we had to get a BIOS [basic input/output system] somewhere. That's pretty low level software all right, so we found Phoenix Technologies and we found a way to get a BIOS because that was Compaq's secret sauce in those days, which was they had their own BIOS. But once you had the right BIOS, then Phoenix would adapt your hardware and then you'd buy MS DOS. Now you have a PC. And so on the hardware side, we were saying, well how can we innovate? How do we differentiate in that environment? We did do some things

like it was smaller and more reliable. But it's not dramatic. So then, the other thing HP was doing at the same time was they created a software division, called the Personal Software Division and their focus was to develop applications for HP's PCs. So in the beginning what that meant was, for the HP 150, which was not IBM compatible, HP had a graphics package and a word processor. They had sort of a screen management thing. This was before there was a graphical interface

So the software division existed sort of side-by-side with the PC hardware division and initially they were writing software for this product called the HP 150, which was really an excellent HP 3000 block mode terminal that we grafted DOS onto and it was an intelligent terminal. It was a DOS but it wasn't IBM compatible. So the software guys developed a series of applications, the basics: graphics, word processing, et cetera, et cetera for that, and then there was another group there that actually paid ISVs because we needed Lotus. All the customers said, "Well where's Lotus, where's Word Perfect? Where's this stuff."

So that was the original model. In about 1984, it became clear that wasn't going to work for two reasons. One is the applications that we were developing for the HP 150 were developed for a very small market. So that business couldn't ever make money if all it did was write software for the HP 150, so they started agitating saying we think Graphics Galley is a great graphics package and why shouldn't we sell it in the open market, which of course made perfect sense, although, their charter was to help differentiate HP hardware. So there were some tugs of back and forth on that. And then, as I mentioned earlier, the ISV part of it fell apart because, in 1984 you couldn't pay Lotus enough money to port to a non-compatible HP PC.

So, as we moved our PC hardware strategy to compatible, okay pick your shots but value added, compatible hardware, then the software strategy completely changed to, "we're going to develop a few software packages and try to compete on the open market and we're going to…" Then what happened is at that time Windows was starting. So that was kind of what happened right, and HP weren't very successful in selling their software on the open market because, of course, they didn't have a software sales force. They'd been used to this model, this historical model, that you kind of give away the software to sell the hardware. There's not enough margin in the PC business for that. And so this was a time when the software organization was kind of struggling and probably-- but in 1985 when we came out with our Vectra, which was our IBM PC compatible product, we did have a set of HP software on it in addition to the third party software, which we made sure that all ran. But as time went on through the 1980s, it became clear that HP had to really focus its software activities and had to figure out also how-- at that point in time there I think the software people realized, in order to get the volume we need to make money at this and to be a leader, we need a whole different way of going to market and selling. And there were some fundamental impediments in HP to doing that because HP had a hardware sales force. They didn't have a software sales force.

Mahoney: Yesterday we talked about DEC and Data General.

McKinney: Yes.

Mahoney: One of the things that came out was how badly those two companies had handled the transition to the PC. They didn't handle it, basically.

McKinney: Right.

Mahoney: They didn't understand what was happening. Was it a wrench for HP to make the adjustment?

McKinney: It was.

Mahoney: What explains the flexibility to respond to this new market, their willingness to take that step and where comes the flexibility to recognize this is an opportunity to do it? Where did the former experience with minis fit into this?

Competing Technologies

McKinney: Well, if we follow my trail, the next thing I did is I went to work managing a software business that was targeting the minicomputer side of the business, which included PCs. It was a client-server computing model, so I can talk about that. But the question you're asking is a really interesting one and that is that, first of all, HP like DEC and Data General were late to the party in the PC market. I'm not that familiar with the story in Data General but I know in DEC because Ken Olsen was very public that the PC business was stupid. It didn't make sense. I think they were a little more top down, hierarchical in their management style and he said we're not going to do it and so they didn't until very late. HP had a very decentralized operating model where you have all these divisions and you've probably gotten a glimpse of this, and a culture focused on innovation and leadership and not, probably, a tidy way to rationalize conflicts. In other words, conflict was tolerated intentionally for a while until things kind of sorted themselves out, particularly new businesses. So what we had is a group in Colorado who had been doing these big high-end technical work stations and they're looking over and they're saying, wow, this PC business has taken off. I bet we could build a PC. So they launch an effort to do it. And then you have the terminal division, which always was an unfortunate name for a division but you had the guys doing the data terminals for the HP 3000 and they said, you know there's really not that much difference between an intelligent terminal and a PC; we're going to build one. And then you've got the guys in Corvallis and they're doing it. And so what HP's problem was, was that we had all these fragmented efforts going on and management wasn't-- some of the management had some pretty negative feelings about the PC business, particularly once we figured out to what extent the architecture had to be the IBM

architecture because that's just not HP. HP wants to make a contribution, which is not a bad thing. So it was a very chaotic, conflicted thing and, in fact, later, Paul Ely, who was running the PC business, about this time, when he saw us going down this IBM compatible road he said, you know, we can't do that and he started another project to build a PC out of HP's new computer architecture that was called PA-RISC [reduced instruction set computer]. And so he actually created a lab that was competing with my lab that was trying to create the first IBM compatible. So you had all this going on. So the good news in this is there was an awareness that this PC market existed and it was important and it was real. And you had a lot of smart people trying to figure it out, and the bad news was it took way too long to get it sorted out.

Mahoney: There was both a good side and a bad side to it. There was corporate acceptance of competition within the organization. You could see this as management saying there's a market out there. We're not sure what the shape is. Let's leave our people to each follow through on what their own vision of what it is about and see how things shape up.

McKinney: Yes.

Mahoney: But you could let that go on too long.

McKinney: You can and that's where, in the early days of the company, Packard and Hewlett would step in. Some people have said that HP intentionally set up competition. I'm not aware of that. It may have happened but I never saw it. It was more that one division that had one charter and another division that had another charter and the market changed and they both saw opportunities and it wasn't clear who was right or if both of them could coexist and what HP would let that happen. Let's see where this goes. And once it became clear, then a decision would be made or if it was prohibitively expensive, we'd say, “We really can't afford to do two of these. We're going to have to place a bet.” So it wasn't completely hands off. But in these cases, both of these organizations were able to meet their business goals and they saw an exciting opportunity in this emerging PC business, so they went after it in their own way and that was a natural outcome of the way HP was managed.

Mahoney: You've got your divisions. They've got their mission. Their mission changes because the market changes.

McKinney: Yes, and they had been going along [a particular path].

Mahoney: You let that happen for a while to see what was going to happen.

McKinney: Yes, and you know when HP got in the minicomputer business, it was a very similar story. There was the HP 1000 and the HP 9000 and the HP 3000 and the HP 250 and then it kind of got all sorted out and they said, “Oh, we need [to have] one architecture and we

need to be able to market [a product line].” One of the interesting parts about HP is it's just a very creative place and somehow it gets rationalized in time and it doesn't become a general problem.

Mahoney: Even though you have those various kinds of minicomputers being built in different markets, you're still dealing with capital equipment.

McKinney: Yes.

HP in the PC Market

Mahoney: When you go into PCs you're entering a commodity market.

McKinney: Yes, well we know that now.

Mahoney: Didn't it appear that way at the time?

McKinney: I think it was becoming more clear obviously as time went on. But I think in the beginning of this period there was still a hope that we could build a proprietary architecture product. Now obviously, how you sell it was one of the issues.

Mahoney: Who were you building it for? What did you think your market for that was going to be?

McKinney: Well I think in the beginning it was for major accounts who were buying the HP 3000. This is a little bit like the saying: “when the only tool that you have is a hammer, then everything looks like a nail.”

Mahoney: The law of instrumental use.

McKinney: Yes, right. So, by the way, and we are digressing I realize, but when HP got into the computer business it was really messy, I mean just as messy as what I just described. HP was an instrument company and the management didn't want to be in the computer business and the view was the first HP minicomputer, which was what now is called the 1000 series, was basically sold to management as an instrument controller; instruments were going digital. We need to have a computer to hook those instruments together to make better measurements and eventually an acknowledgment of, “Oh gee, I guess we're in the computer business.” And I remember, by the way, the same story with printers. I remember John Young, at one point, saying, “How big is this laser jet business now?” And somebody told him that it was a big number. He said, “Oh God, I guess we're going to have to care about it.” So there's a little bit

of a pattern here with this. I may have digressed completely. So it was a bit of a messy story. But anyhow, if I could, about this time, I was R&D manager for the desktop PCs. We came out in 1985 with the HP Vectra, which was our first IBM compatible. At that point in time, we didn't need ISVs [Independent Software Vendors] because our hardware was supposed to run all the software. We had to have a lab to make sure it all worked together. We might do some joint marketing, et cetera. The PC software group had been reoriented to focus on trying to sell their own packages on the open market to compete, but as it turns out that didn't work too well.

Mahoney: Would those packages run on IBM architecture?

McKinney: Yes, exactly. Then, about that time, I was asked to also be the R&D manager for the PC Group, which included Corvallis; and Corvallis had just come out with their first notebook computer, which had huge compatibility issues; Corvallis hadn't really learned what we had learned about compatibility. Of course, the Apple Mac had just come out, so suddenly now everybody's thinking about bitmap graphics and this stuff and so on. I did that for about a year and then I got this phone call from a guy name Bob Frankenberg, who would be interesting for you to talk to if you can, and he was running a business unit in HP called the Office Systems Business Unit. And what that consisted of, it was kind of HP's answer to DEC's ALL-IN-ONE. I don't know if you're familiar with IBM's PROFS [PRofessional OFfice System] or DISOSS [DIStributed Office Support System]. It was basically a set of software that was sold along with the HP 3000 for email, word processing, database access. It was an Office Suite.

R&D Management in the UK

And there was a division in the UK, outside of London, that was responsible for the core of that and the email software for it. And so Bob asked me if I would go over. The Division Manager, Paul Ely, who was dead set against us building an IBM PC compatible, had left the company and hired the person who was running this division and so Frankenberg said, “Would you come over and run this business.” So I went from being R&D Manager to being a General Manager of a software business inside HP for the first time. It was quite an interesting experience. The software we were building was called HP Desk Manager in the beginning and that was all HPs. It was kind of the core of the integration that linked all the software together plus the email solution. This was sold into HP major accounts along with the HP 3000. The sales force was not really paid for it or what they were paid didn't cause them to want to sell software. I used to say the profit went down the closer you got to the equator because in southern Europe they just give it away and in northern Europe they might charge a little bit for it. But we had this same sort of structural issue around the software business as opposed to software products and technology. We had really good technology in products and I think HP actually missed an opportunity to be a major software player by not understanding the fact that it's a business. It's not just the bits. We had great products but we didn't ever market them or sell them. We didn't have a sales force that was ever paid to do that.

Mahoney: Were you thinking that this was software that was going to run on the machines that you were selling?

McKinney: Yes, one of the nice things about working far away from Palo Alto was you didn't see management as much <laughs>. So they would come by maybe once a quarter, twice a year, but the bad news was it seemed like everything had changed in that time and you didn't know it. But I can remember this business was very small in revenue. As I recall, it was under $20 million. It was losing money because, of course, if you're only selling that software on the HP 3000 and you don't even have a sales force that's charging for it, it's pretty hard to make money and I think we had a couple hundred people totally doing this now. And so I put together a plan with the team here. I said, we got to get this thing profitable and that's another core HP value is that you've got to make money. It's not everything, but if you can't make money you're really not around to do anything else. Packard always believed profit is what allows us to exist. First of all it's the best measure of your contribution and secondly it allows you to do the other things. I remember that the obvious conclusion is we've got to put this stuff on UNIX and we've got to sell it in the open market. I presented that to the guy who was running the computer business at the time and he said, "You don't understand, your software is to differentiate and sell our hardware." And I'd say, oh, okay.

So then we'd go back to plan A, and then next quarter they'd say, why are you losing so much money <laughs>? Well what I took away from this is one of my most important lessons: you just got to be clear about your strategic intent. And in both of these cases, in PC software and in the minicomputer software, there was confusion in the company over why are we in this business or, in fact, are we in the business or is this a hardware business where we are trying to differentiate the hardware. And if it is, then you can do that but there's a cost to that and ultimately in big markets that doesn't work because someone else, some other software player is going to come along targeting a broader market. Anyhow, I was there. And then about this time, Frankenberg found this project in the HP labs in Bristol, England, that became known as HP NewWave. I don't know if you've ever heard of HP NewWave, but the Mac had come out. That caused the hardware people to start thinking a little more about that too and then Windows came out, but it wasn't really that successful if you recall.

Mahoney: I remember the early versions.

McKinney: This was not unusual with Microsoft, but the first versions aren't always great. So there was Windows 1. And our customers, these MIS people we were calling on, were saying, "We really like this client/server idea." Frankenberg had been, I think, one of the first to basically say: instead of terminals we were really going to target PCs, network to our HP 3000s for email for our products. So we had a pretty big effort in the DOS era on moving Word, the client side of word processing, onto the PC platform and selling these integrated office systems that included HP 3000s and PCs. So that was our strategy. But HP was still really struggling

with, how do we make a contribution in this commoditizing PC market? And customers were saying, “This stuff is too hard to use. We have all these repetitive tasks and they're not easy to automate and so we like Windows but it really doesn't seem to solve our problems.” And so forth. Frankenberg saw this prototype in England that essentially was an object oriented user interface. It's the way computers look now, and this was 1986, and he sort of bet the software farm on this thing called NewWave. So he picked it up.

He moved it to Santa Clara, here to this personal software division, which I described earlier, this application and said, “We're going to differentiate ourselves by putting an environment on top of Windows that is going to have an object oriented system, drag and drop system.” And we built in this agent capability that allows people to easily automate tasks and stuff and this is going to be the differentiation and we are going to develop a few NewWave applications ourselves. So everything sort of moved to this NewWave model. The guys in Santa Clara started working on NewWave Word and NewWave Graphics and so on and in Pinewood, where I was in the UK, we did a NewWave mail product as well. But the guys in Santa Clara were responsible for getting this basic environment to happen, this NewWave environment, which technically was a Windows application but it fundamentally completely redid the user interface and had an object oriented data structure.

Mahoney: By the way, it runs on top of LINUX.

McKinney: That was later; it was just on Windows at the beginning. Meanwhile I'm over in Pinewood and I was much more focused really, at that point, on the minicomputer side of things rather than this one NewWave application. And I ran a marketing center in Europe to try and get all our software to market. And then in 1988, Frankenberg asked me to come back and run the division that was responsible for NewWave. By the way, you notice I was willing to move. <laughs> I thought living in the U.K. would be fun and our kids were at a good age for it and my wife and I were always interested. We were more interested in living there than Seattle, let's say, and it was a temporary move, not a permanent move, so we decided the timing would be good.

Mahoney: Did it work out?

McKinney: Oh Yes. It really did. It was a great experience.

Mahoney: We've taken our kids abroad a couple of times.

McKinney: Yes, my kids are still incredible travelers and we still have very close friends [in the UK]. In fact, we are heading over to the U.K. later this month and are going to spend about a month vacationing with friends that we made when we were there, so it worked out on many fronts. But like all moves, they have their challenges.

NewWave

Anyhow, I came back and the problem with NewWave was that they were having trouble getting it done. So I was asked to come back [to the US] and told that we have to get this thing out. You're probably going to talk with Phil Sakakihara. He was the R&D Manager for NewWave and though not the original brains behind it. But once it got moved from the UK, he became sort of the real technical leader behind that. At this point in time, Microsoft thought NewWave was a great thing, I mean, because Windows was not yet successful. There were very few Windows applications.

The fact that a company like HP would do NewWave, they just thought that was great, but later they changed their mind. Windows 3 was the version that finally became successful and then Apple sued HP for infringing on Mac copyrights based on the Look and Feel. They sued HP and Microsoft, which upset Bill Gates to no end and Gates actually then started running around and telling all our customers not to buy New Wave and it's a long story, but that certainly wasn't helpful. It wasn't in any way the only problem. NewWave was a lot of software and it required a lot of hardware, so it was kind of an expensive system solution. That was one issue with it. And by the way, we were selling NewWave. It was viewed as a direct HP sale to a corporate account, so it wasn't viewed as go down to, at the time, CompUSA and pick up a box and put it on your computer.

Mahoney: So you still had the earlier business model.

McKinney: Still had that business model.

Mahoney: You're going after the corporate sector?

McKinney: Right and in fact, what you do is you sell MIS and the MIS people are going to do a bunch of work to integrate their solution and you are going to come to work on Monday and there's a NewWave workstation on your desk and you just play with it. You don't have to understand how it works. You don't have to configure it; it's all done for you. So again, this was the direct selling into corporate accounts. That was the target.

Mahoney: Was the idea that the MIS divisions within the corporations would then customize it to their particular needs?

McKinney: Right, Yes, I guess you had two customers. You had MIS and, if marketing was going to be the place they were going to deploy it, you had to sell it to the marketing people as well. But the MIS people were going to do the work and in those days, there were still a lot more MIS people there.

The Changing PC Market

Mahoney: Now were you going to leave the application software on it?

McKinney: We had the Vectra line. We kept coming out with 286s and 386s and that business was going okay, although there was a similar go to market problem on the hardware side because most PCs weren't being sold by major account sales forces. They were mainly sold through dealers too. HP in that era, one of the problems, was still thinking about it as kind of a minicomputer go to market model, not that we weren't in the dealer channel, but where was the primary focus. In fact, a related story from this time, when I went to Pinewood, HP had just come out with the LaserJet. And Pinewood was so tired of all these printers coming out. They said, "We're not going to write a driver for the LaserJet with our software in it." And the LaserJet came out with - I don't know if it was a RS232 or something. It was an industry standard interface instead of a proprietary. The LaserJet guys targeted the broad market and that was viewed as heresy at the time because HP management was still all HP 3000. It was a corporate account. It was selling systems, yes.

Vectra was doing much better but still not a runaway success at that point, in part for that same reason. Of course, how you price and everything is related to what channels you go through and so there were some pricing issues too. But what happened on the software side is we then went into corporations selling this solution: HP 3000, Vectra, NewWave, and then a set of new applications that came from HP. Okay, now we are back in the ISV business again because as it turns out, Windows applications could run on NewWave unmodified. But to really take advantage of NewWave, they needed some additional APIs that were created, and so you really wanted the ISVs to really support the object oriented model and some of the drag and drop and the agents and some of these capabilities, then the ISVs needed to do a little work. Well, this is kind of the same story all over again by the way.

In the early days, when Windows wasn't a success, we had a lot of ISVs. The leading edge Windows ISVs were all supporting NewWave because they loved the technology. They thought it was really cool. It didn't take them that much effort. It was much simpler to do than, say, the earlier HP models. But once Windows took off and Microsoft started introducing their Windows applications, those guys said, "Whoa, I don't have time for this stuff. I got to go after the broad market." And so we started having the same mistakes. This was in some sense a similar mistake made again, which is that it became clear that it was increasingly difficult to get ISVs to spend the opportunity cost to put effort into this product, which was really cool technically but wasn't targeting the broad market. And then about that same time, Microsoft went extremely hostile and Gates literally personally went around and told some of our big customers- -I remember American Airlines, and Proctor and Gamble-- big corporate accounts who had committed to NewWave, and he basically went to the head of MIS and told them they made a

huge mistake, that Microsoft was going to have something better soon. Well they did eventually, but it wasn't soon, so you've probably heard these stories before.

Mahoney: Well, I've heard them except the company was called IBM.

McKinney: Yes, right, right, so it wasn't only IBM. But ultimately what happened was that NewWave was a problem. Actually John Young at one point said, “How much have we spent on this?” This is like three years into it. And I can't remember the answer but it was tens of millions of dollars and he said that it had been pretty good advertising. So it was a big differentiator for us. It got a lot of attention in MIS. Ultimately it was not successful and by then Microsoft was a major application player in the Windows era with Microsoft Office and that sort of thing and eventually the window had pretty much closed on that.

Another Shot at the PC Corporate Market

We did make one last attempt. There was a management change in HP where Dick Hackborn took over the PC business, which included the PC software. And Dick was a real solid guy saying that the business has to make money et cetera, et cetera, et cetera. He said give us a year to see if we can, with a completely different model now, independent software, target the open market. Let's see if we can make a go of this thing. And we had goals for every quarter. We'd review with him. And we came up with a product called Dashboard, which was a PC kind of a toolbar, so it was kind of like NewWave Light. It was designed to make the PC much easier to use but it was designed for the real market, in every way. It turned out that product dominated its segment but it was a very small segment. It was a few million dollars a year. And then NewWave, we could never figure out how to get NewWave, it was such a complex product and we actually spent a fair amount of money trying to position it in CompUSA and these places, and we never could. By then a product had come along called Norton Desktop for Windows and that kind of defined the desktop. We used to call NewWave an environment and people would say, what's an environment? Does that include the furniture?

By the way, an interesting lesson was that consumers like choices. And if you do something and you say oh this is unique, that's not a good way to sell something because people want to compare. People like good, better, best. Now we could have established a category, but people want to know it's better than this. It’s better than that. So we struggled, I think on the marketing side of NewWave to try to create a mass market. And then Norton Desktop came along so we sort of positioned it as a better one of those, but after about a year or more we basically said, the window has closed right now in PC software and we basically exited that business. So I think we sold Dashboard. We sold one of the products actually to Philippe Kahn, who then turned around and sold it to Motorola and made a bunch of money on it. But we sort of divested us ourselves from the PC software.

Mahoney: Your ISVs here were companies that you were looking for to patch up the incompatibilities between your product and Windows?

McKinney: Well, are you talking about in the NewWave era?

Mahoney: Yes.

McKinney: In the NewWave era, the ISVs were the early Windows ISVs. Micrographics is one company. It was a company in Texas that had a great graphics package. I think SAMNA, which ended up being bought by Lotus had a product called Omni or OmniPro, which was a Windows word processor. So in the beginning of, in the early phase of Windows, there was a new set of ISVs that came around. Usually the WordPerfect's of the world didn't move very fast. It was just like HP and the minicomputer business. It was hard to get excited about the PC business. So they were dominated in the DOS world and they weren't as quick in embracing Windows as some of the new startup ISVs were. We were working with the leading Windows ISVs at the time and asking them to enhance, to support the NewWave APIs in their Windows apps. So it would be the same box. Micrographics, I forget what the name of their product was, but Micrographics Graphics package for Windows and then it would say and NewWave. And so it's the same code, it's the same box. It solved a lot of the problems we had before in the DOS era where the dealers had to carry a separate piece of software for the HP 150. But at the same time, it still required Micrographics to do work in order to support NewWave. And so ultimately that became an opportunity cost issue for them, is the way I look at it. They were very enthusiastic about the technology. They thought it was great. That's where things were going, and they liked being associated with us because it differentiated them. But once Windows 3 took off like mad, suddenly you've got a mass market. You've got Microsoft coming at you with a whole suite of applications that became Microsoft Office and they basically said I think we've got a truck coming at us.

Mahoney: They've got to develop the product in such a way that it runs on Windows and it supports NewWave. And at one point, Windows is here and NewWave is here, and then Windows gets a larger and larger part of the job. Then the cost of doing that simply isn't worth it in terms of sales for them.

McKinney: Yes, I think they were directly threatened by Microsoft's application effort and if you are back in the DOS era, Microsoft wasn't a major player in applications, but Microsoft bet on Windows before anyone else did. And so when the Windows transition really took off, Microsoft annihilated WordPerfect and Corel and all these people who had been leaders and Lotus, who had been leaders in the first generation of PC applications. And so the guys we were working with just saw this enormous threat with Microsoft. They had to put all their effort into defending themselves against Microsoft and so that extra effort to support NewWave was just too great an opportunity cost to do it. And then I think the fact was that NewWave was

succeeding in the corporate market to a degree, but it certainly was not becoming a mass market success and never would; so, they really had to curtail their efforts there. So what we did is actually we invested in NewWave to make standard Windows applications be able to do more. That was kind of our counter. We said, okay we got it, only our applications are going to take the time to support these APIs. But now that we know that, we can add capability to NewWave that will allow us put wrappers around standard applications that maybe wouldn't do everything, but you could still do a lot more than you could with standard Windows. So we went down that path for awhile. But ultimately, I don't remember the years exactly, but ultimately this would have been the early 1990s, we pretty much made the decision that we have to support our existing customers, which we did for years, but we basically are going to stop any new development in PC software for now.

Mahoney: So you did stay with that original corporate market?

McKinney: Yes. Well there was an attempt at the very end when Hackborn took over and he'd done the LaserJet and then the Inkjet and he was probably the guy at the top of the company that was most savvy about how to really play in the open market. We'd pitch to him, “Let us try that in PC software,” and so we did, for that last year, make a go at that and we weren't successful. By the way, there is an interesting story about that time. So once we did that, we did our homework finally and said, “Oh, yes, this is where software is sold, that's where we need to be.” At that time CompUSA was a huge seller of software on the open market and that's in particular where tools like Norton Desktop for Windows, tools that we were creating, if you think about it, were sold. And so I went to the guy who was running HP's reseller sales force, all the people, dealers through retailers, who resold our products to end customers. And I gave them this nice presentation, we'd done all this homework, Hackborn is supporting us, and this is where we need to go and we think CompUSA would probably be the best place for us to launch. And he basically forbade us to do it. He blocked the channel because he said if CompUSA gets our software, the next thing they're going to want is our printers. Well, the irony of this, of course, is that largely became HP's printer business. The retail business in printing is enormous for HP today and very, very successful. But again, he was trying to protect HPs dealers, the commercial resellers from the retailers, so he's got a business and if we are out here causing all the problems, they're going to be mad that these retailers are getting some HP products. He was more concerned about protecting his current business than growing a new one. So there's a common theme. But, although it took a fair amount of work, we ultimately did get access to the channel. But we weren't successful with it, so we did try the open market, the PC software open market. We did try to go after the broad market for about a year, but I was the first one to say, “Listen, we're falling short of our goals A and B. Look what's happening out there.” Microsoft was taking over the world with Microsoft Office and the game was over at that point in time unless you wanted to really be a niche player, which didn't really make sense for HP. We didn't need to. There were lots of ISVs out there that used our hardware. We were compatible, so our hardware had all the applications they needed.

Mahoney: In order to get into the business, HP had to basically look like somebody else. If you are going to get into the commodity market, then it was going to have to be IBM architecture with the Intel machines.

McKinney: Yes, essentially what the market was telling us was the game was over, at least for then. I mean obviously, it's funny now. People don't even think about it as IBM. I mean IBM's not even in the PC business anymore, so people don't think of it as IBM compatible anymore. It's just it's a PC. And the definition of compatibility has obviously changed a lot. But at that point in time, it was IBM compatible and that really stuck in the craw of most of HP's top management as Bill and Dave never would have built a clone.

Mahoney: The decision was to go with the Intel 386 chip as opposed to following Apple over to a Motorola chip or something like that?

McKinney: Yes, although that was another big controversy because the technical workstations in HP, at that time, were all based on Motorola and all the computer scientists knew that it was a better architecture. But it didn't matter because IBM PC used Intel and that was where the market was, Apple I don't think was using the 68000 in those days. I guess they did on the MAC, didn't they?

Mahoney: Yes, the MAC had a 68000.

McKinney: But you couldn't build an Apple clone because you couldn't buy their DOS, because they chose to keep their stuff together. So the only market that was really accessible to us was building an IBM PC compatible and then trying to find out, over time, how to differentiate ourselves in that business. I think an interesting perspective on it is the great success of Dell and they differentiated in how they sold the product. The product wasn't differentiated but they differentiated through direct selling. So I think the question of, what's your contribution, back to the question John Young put shivers down my spine by asking me. It's a great question, but you need to answer that in a business context, not just in a technology context.

Mahoney: Ultimately with operating systems for minicomputers, you're going to have to basically go with a version of UNIX.

McKinley: Which by the way, we ultimately did.

Mahoney: I know.

McKinney: We built the next generation mail server, Open Mail it was called, when I was in Pinewood. We had these quarterly reviews going back and forth that you got to make money. No, you're here to differentiate our hardware. No, you've got to make money. Ultimately, again there are advantages to being away and we just built a UNIX-based mail server, and we could say we could just target it on HPX or we could go after the broad market. So we could make the marketing decision independently but we knew we had to build the next generation mail server which was called Open Mail, which, it was after I left, but ultimately was not only sold on HP UNIX but was sold on the open market and, actually in the UNIX world, it had pretty broad penetration. Again, it's a server product, it's not the kind of volumes of PCs, but a lot of companies actually used Open Mail.

Mahoney: Have we reached the end of the story?

McKinney: Well, we may have. Yes, I don't know. We've talked about a lot. It's up to you if there is anything-- I don't have anything, I certainly don't. I didn't ever really work in any software related things after that, not really. I was obviously around and had some perspectives on some other things but you know, I think we've covered most of the important things.

Mahoney: Thank you for an interesting oral history interview.

